FREQUENCY TUNABLE RESONANT SCANNER AND METHOD OF MAKING

ABSTRACT OF THE INVENTION

A MEM s scanning device has a variable resonant frequency. In one embodiment, the MEMs device includes a torsion arm that supports an oscillatory body. In one embodiment, an array of removable masses are placed on an exposed portion of the oscillatory body and selectively removed to establish the resonant frequency. The material can be removed by laser ablation, etching, or other processing approaches. In another approach, a migratory material is placed on the torsion arm and selectively stimulated to migrate into the torsion arm, thereby changing the mechanical properties of the torsion arm. The changed mechanical properties in turn changes the resonant frequency of the torsion arm. In another approach, symmetrically distributed masses are removed or added in response to a measured resonant frequency to tune the resonant frequency to a desired resonant frequency. A display apparatus includes the scanning device and the scanning device scans about two or more axes, typically in a raster pattern. Various approaches to controlling the frequency responses of the scanning device are described, including active control of MEMs scanners and passive frequency tuning.